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14. ABSTRACT
A second realization of the International Celestial Reference Frame, ICRF-2, is currently underway with a projected completion date concurrent with the 2009 IAU General Assembly. This work is being carried out by two working groups: the IERS/IVS Working Group will generate ICRF-2 from VLBI observations of extragalactic radio sources, consistent with the current realization of the ITRF and EOP data products and the IAU working group will oversee the generation of ICRF-2. Of primary importance to this work is the selection of a set of defining sources to be used to orient the ICRF-2 axes. These sources should be as positionally stable as can be determined with existing data and analysis. It is well known that compact extragalactic sources have variable and unpredictable emission structures on scales larger than the accuracy of their position estimates. Temporal variations of the intrinsic structure of these objects results in apparent motion when astrometric observations are made at several epochs. Generation and analysis of position time series is one method to address this issue. Here we compare two methods for generation of position time series.

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ANALYSIS OF ASTROMETRIC POSITION TIME SERIES FOR ICRF-2

A.L. FEY & D.A. BOBOLTZ
U.S. Naval Observatory
3450 Massachusetts Avenue, NW
Washington, DC 20392-5420 USA
e-mail: afey@usno.navy.mil, dboboltz@usno.navy.mil

ABSTRACT. A second realization of the International Celestial Reference Frame, ICRF-2, is currently underway with a projected completion date concurrent with the 2009 IAU General Assembly. This work is being carried out by two working groups: the IERS/IVS Working Group will generate ICRF-2 from VLBI observations of extragalactic radio sources, consistent with the current realization of the ITRF and EOP data products and the IAU working group will oversee the generation of ICRF-2. Of primary importance to this work is the selection of a set of defining sources to be used to orient the ICRF-2 axes. These sources should be as positionally stable as can be determined with existing data and analysis. It is well known that compact extragalactic sources have variable and unpredictable emission structures on scales larger than the accuracy of their position estimates. Temporal variations of the intrinsic structure of these objects results in apparent motion when astrometric observations are made at several epochs. Generation and analysis of position time series is one method to address this issue. **Here we compare two methods for generation of position time series**.

1. PARAMETRIZATION OF TWO SOLUTIONS

Table 1: Parameters of Two Solutions

	usn000d	**usn001a**
Software	CALC/SOLVE	CALC/SOLVE
Data Used	1979-2007	1979-2007
Sessions	4170	4170
Observations	5238056	5238056
Solution Type	Baseline	Independent
No.of Solutions	8	4170
Reference Frame	NNR wrt ICRF	usno2007b
Atmosphere	20 min	20 min
Clocks	60 min	60 min
Gradients	6 hrs	6 hrs
Stations	Local	Fixed[a]
Sources	Global/$\frac{1}{8}$ Local	Local
EOP	Fixed[b]/UT1 Rates	Fixed[a]
Nutation	Offsets	No

[a] usno2007b
[b] Bulletin A

Two sets of global solutions using the CALC/SOLVE software were produced. Parametrization of the **usn000d** solution set followed that of the ICRF. The **usn001a** solution set consisted of 4170 "independent" solutions with fixed TRF and fixed EOP. Parametrization of the two solution sets is listed in Table 1. The only free parameters in the usn001a solution set were clocks, atmosphere including gradients and source positions.

2. ANALYSIS AND RESULTS

Table 2: Differences between Weighted Mean Positions and ICRF-Ext.2

Series	Matching Sources	Weighted Mean±WRMS (μas)		Median (μas)	
		$\alpha\cos\delta$	δ	$\alpha\cos\delta$	δ
usn000d	679	15 ± 117	-29 ± 137	15	-20
usn001a	679	55 ± 193	-80 ± 244	69	-48

Table 3: Statistics of Time Series for Sources with $N_{epochs} \geq 10$

Series	No. Sources	Mean/Median of WRMS (μas)	
		$\alpha\cos\delta$	δ
usn000d	588	400/297	534/417
usn001a	588	672/417	880/664

Positions estimated in the two solutions were compared. The following preliminary conclusions can be drawn from these comparisons:

- Positions (weighted mean) derived from the usn000d time series agree more closely with ICRF-Ext.2 than those from usn001a (see Table 2)
- Positions from usn001a show more scatter than those from usn000d. The wrms scatter of positions is larger, on average, by about a factor of 1.7 (see Table 3)
- Although usn001a estimates position time series using a consistent TRF and EOP with no required NNR constraint on source positions, the resultant increased noise in the solution suggests that the parametrization of the usn000d solution is preferable
- The increased noise in the usn001a position time series is presumably due to the decrease in the number of free parameters in the solution and hence fewer un-modeled or mis-modeled parameters get absorbed elsewhere